EPA841-F-05-002B

Developing a Data Analysis Plan for the Wadeable Streams Assessment (WSA)

Key Questions WSA will Examine

The results of the Wadeable Streams Assessment will be used to characterize the ecological condition of small streams throughout the U.S. The study is designed like an opinion poll: 1100 sites were selected at random to represent the condition of all streams in regions that share similar ecological characteristics. This is the first time a national monitoring study of streams has been conducted using this approach.

Goals

Produce a report on the condition of wadeable streams of the U.S. by December 2005

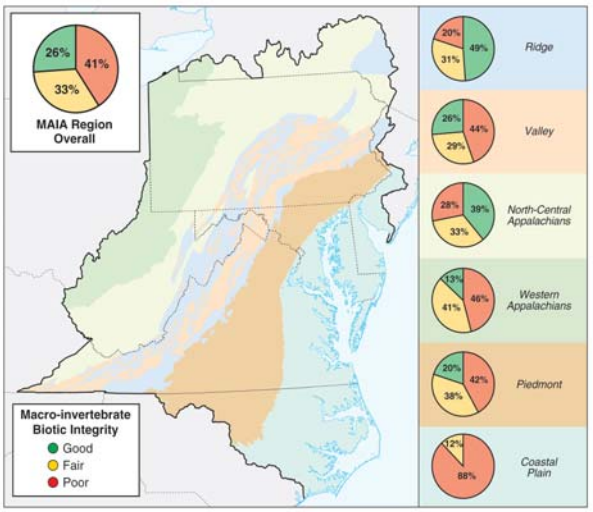
Promote collaboration across jurisdictional boundaries in the examination and assessment of water quality

Build State capacity through use of survey design and comparability of methods or indicators

Question 1: What % of the Nation's wadeable streams resource is in good condition?

Addressing this question requires input from WSA Partners regarding:

- ✓ What are the appropriate ecological indicators for describing condition of the resource based on the data collected?
- ✓ How do we set expectations for these indicators for least-disturbed settings?
- ✓ What are the thresholds or benchmarks for judging condition as (good, fair, poor)?



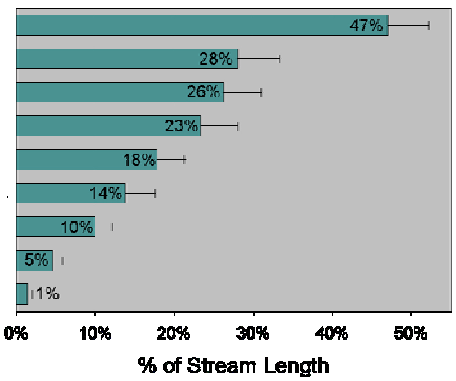
Mid-Atlantic stream condition using macroinvertebrate data

Question 2: What is the relative importance of stressors as evaluated in the WSA?

Addressing this question requires input from WSA Partners regarding:

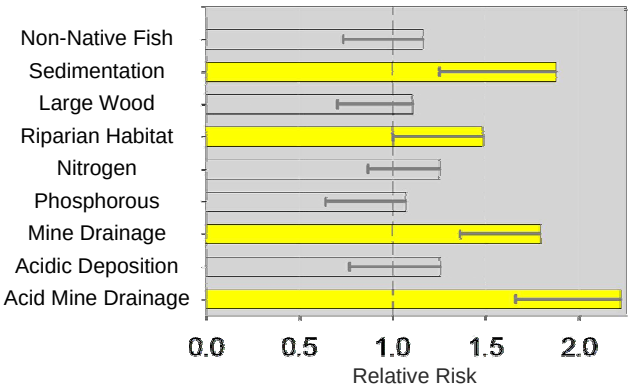
- ✓ What WSA measures are best for describing stressors?
- ✓ What is the linkage between stressors such as nutrients, sedimentation, habitat alterations, etc., and biological indicators?
- ✓ What is the relative risk to the ecological indicators from the stressors?

Stressor effects on stream condition



Percent of stream length in poor condition for each of the stressors to streams in the mid-Atlantic with 90% confidence intervals around each estimate.

Relative risk to macroinvertebrates



The length of the bar represents the increased likelihood of encountering poor macroinvertebrate assemblage when the stressor is also ranked poor.

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Key Issues in Data Interpretation

The central focus of data interpretation is to differentiate among aquatic conditions ranging from high quality natural conditions to low quality severely altered conditions. A collaborative effort among the various partners will include evaluation of several approaches for analyzing and reporting the assessment results at the ecoregion level II scale, and then aggregating up to a regional and national scale. It is envisioned that partners will build on existing efforts of states, EPA, USGS and other organizations. Because of the large-scale and multijurisdictional nature of this effort, the key issues for data interpretation are unique and include:

Scale of Reporting

Many of this project's partners generally select monitoring sites that represent assessing conditions for a small stretch of streams, usually in response to specific problems. For the WSA, sites were randomly selected across large-scale reporting units to be representative of conditions of all the waters in that unit. Using a probability-based design, about 50 sites were randomly selected throughout each potential reporting unit, i.e., level II ecoregion, EPA region, and major river basin. The data from these sites will be aggregated to describe the range of the conditions throughout the reporting unit.

Selecting the best ecological indicators

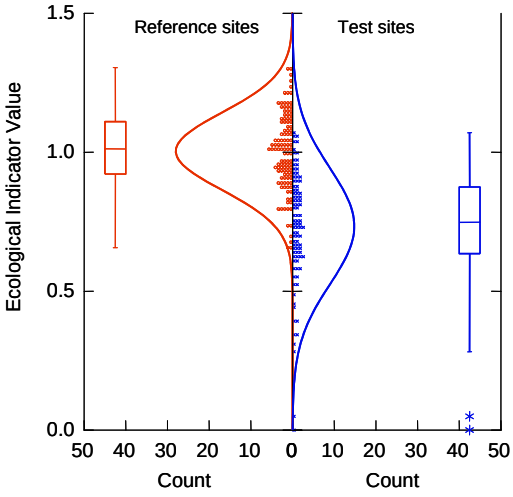
Every state and tribal agency has ecological indicators that are used as a basis for assessing condition. In the WSA, these indicators will be evaluated for use on regional and national scales. It is anticipated that only a few candidate indicators will be universally applicable for all of the reporting units that constitute the continental US. The primary biological indicator will be derived from the benthic macroinvertebrate data collected at each stream site.

Defining least-impacted condition as reference

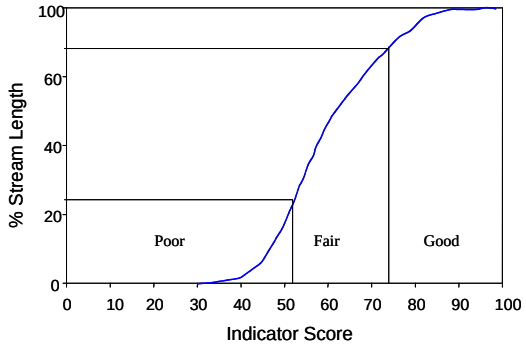
Each state provided a list of candidate reference sites from their monitoring and assessment program. A subset of these sites was selected to represent a regional reference condition for each of the ecoregions. These sites plus higher quality sites from the probability data set will be used to develop expectations for the ecological indicators. The regional reference condition will serve to anchor the best quality of the indicators expected to be found throughout the reporting units.

Determining thresholds for judging condition

A decision framework exists for each agency for how to judge the condition of its aquatic resources. The condition is normally presented as a value system of "good", "fair", and "poor." The thresholds that differentiate these condition qualifiers will be determined through evaluation of current state-derived thresholds, analyses of the data along a biological condition gradient, and in conjunction with discussions among the partners.



Distribution approach (comparing ambient and reference distributions)



Distribution function to determine ecological condition of the water resource

Consensus-based Process to Develop the Data Analysis Plan

The data analysis plan will be developed via:

1. Convene a workshop of about 20 experts, including researchers, state and EPA biologists, and managers, to discuss key questions and data analysis options, perform exploratory analyses, and prepare a detailed plan for review and discussion among the states and other partners.
2. Convene a national meeting of states and other partners to reach consensus on the analysis and presentation of the data for a summary report at regional and national scales.
3. Convene regional workshops to implement the data analysis plan.